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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/845,356	05/01/2001	Masayuki Mishima	Q64324	2603

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EXAMINER	
YAMNITZKY, MARIE ROSE	
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1794	

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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	09/845,356	MISHIMA, MASAYUKI	
	Examiner	Art Unit	
	Marie R. Yamnitzky	1794	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *31 October 2007*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *29 and 33-50* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *29 and 33-50* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submissions (amendment and Rule 132 Declaration) filed on October 31, 2007 have been entered.

2. Applicant's amendment filed October 31, 2007 amends claim 29, cancels claims 30-32 and adds claims 33-50.

Claims 29 and 33-50 are pending.

3. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.
>
> (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

4. Claims 29, 33-35 and 49 are rejected under 35 U.S.C. 102(e) as being anticipated by Forrest et al. (US 6,310,360 B1).

Forrest et al. disclose light-emitting devices comprising a glass substrate, an anode, an organic compound layer including a light-emitting layer/zone containing three light emitting materials, and a cathode. See the entire patent to Forrest et al. In particular, see Fig. 1, Fig. 3, column 9, line 1 - c. 11, l. 60, c. 12, l. 58 - c. 13, l. 50, c. 14, l. 63 - c. 15, l. 17 and c. 17, l. 9 - c. 19, l. 19. Note that c. 11, l. 57 contains an error in that λ for $Ir(ppy)_3$ should read ---~500 nm-- rather than "~400 nm". In Forrest's Example 1, the light-emitting layer consists of an alternating series of layers of CBP doped with $Ir(ppy)_3$ and CBP doped with DCM2.

"CBP" stands for 4,4'-N,N'-dicarbazole-biphenyl, which is a blue light-emitting material having a light-emitting wavelength peak of about 400 nm.

"$Ir(ppy)_3$" stands for *fac* tris(2-phenylpyridine) iridium, which is a green light-emitting orthometallated complex of iridium having a light-emitting wavelength peak of about 500 nm.

"DCM2" is the abbreviation for a pyran compound that is a red light-emitting compound having a light-emitting wavelength peak of about 590 nm (the full name is given at c. 4, l. 56-58 and the formula is shown at the bottom of c. 9).

The device of Forrest's Example 1 meets the limitations of a light-emitting device as claimed in present claims 29, 33-35 and 49.

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

6. Claims 29 and 33-50 are rejected under 35 U.S.C. 103(a) as being unpatentable over Forrest et al. (US 6,310,360 B1) as applied to claims 29, 33-35 and 49 above, and further in view of Egusa et al. (US 5,294,810) and either one of Igarashi et al. (US 2001/0019782 A1) or Thompson et al. (US 2002/0034656 A1).

Forrest et al. disclose a device comprising more than one light-emitting material, each of the materials capable of emitting light of a different color, wherein one of the materials is an orthometallated complex. In Forrest's device of Example 1, green and blue-light emitting materials are contained in one light-emitting layer while red and blue-light emitting materials are contained in a second light-emitting layer.

With respect to present claims 36-47, in Forrest's device, the light-emitting layers only comprise one orthometallated complex (the green light-emitting material $Ir(ppy)_3$). Forrest et al. do not disclose a device utilizing an orthometallated complex, such as an iridium complex of a 2-phenylquinoline derivative, as the red light-emitting material.

With respect to present claim 48, Forrest et al. do not disclose a device in which red, green and blue emitting materials are contained in the same layer.

With respect to present claim 49, while the claim requires the light emitting materials to be contained in different light-emitting layers, the claim does not explicitly require three different light-emitting layers. If claim 49 were to be interpreted as requiring three different light-emitting layers, each containing only one of the blue, green or red light-emitting materials, then Forrest's device of Example 1 would not meet the limitations of claim 49.

With respect to present claim 50, the device of Forrest et al. does not emit white light.

It was known in the art at the time of the invention that the color of light emitted by a light-emitting device can be controlled by the selection of light-emitting materials used in the device, and that emission of white light can be achieved by providing an appropriate combination of light-emitting materials.

Egusa et al. disclose light-emitting devices, teach that a light-emitting device may comprise more than one light-emitting layer (e.g. see column 11, line 40 - c. 12, l. 60 and c. 19, l. 52 - c. 20, l. 61), teach that different light-emitting materials may be mixed in a light-emitting layer in order to control light-emission wavelength and that the mixture may include a phosphorescent material emitting light from a triplet excited state (e.g. see c. 25, l. 36 - c. 27, l. 15), and teach that it is possible to achieve emission of white light from a device comprising multiple light-emitting layers and from a device comprising a mixture of light-emitting materials (e.g. see c. 20, l. 57-61 and c. 26, l. 15-28).

It would have been an obvious modification to one of ordinary skill in the art at the time of the invention to provide light-emitting devices similar to those disclosed by Forrest et al. but utilizing different and/or additional light-emitting materials in combination with the iridium complex $Ir(ppy)_3$, either in the same layer or in a light-emitting layer separate from the layer comprising the iridium complex. One of ordinary skill in the art would have been motivated to utilize different and/or additional light-emitting materials in combination with the iridium complex so as to provide a device having the advantages of using a phosphorescent material as taught by Forrest et al. while at the same time being able to modify the color of light emitted by the device as taught by Egusa et al. It would have been within the level of ordinary skill of a

worker in the art at the time of the invention, as a matter of routine experimentation, to determine suitable and optimum combinations of light-emitting materials selected from known light-emitting materials so as to obtain a functional device capable of emitting light of the color(s) desired. One of ordinary skill in the art would have been motivated to select a combination of light-emitting materials capable of providing white light when the light-emitting device was intended to be used for an application where white light was desirable.

With respect to the requirement for an orthometallated complex as the red light-emitting material, orthometallated complexes that emit red light were known in the art at the time of the invention. Igarashi et al. disclose orthometallated complexes that emit red light and that are iridium complexes of a 2-phenylquinoline derivative (e.g. see paragraphs [0102]-[0125], [0177]-[0182] and [0186]). Thompson et al. also disclose orthometallated complexes that emit red light and that are iridium complexes (e.g. see Fig. 31, Fig. 37, Fig. 43 and paragraph [0183]). The selection of suitable and optimum combinations of red, green and blue light-emitting materials from known materials would have been within the level of ordinary skill of a worker in the art at the time of the invention as a matter of routine experimentation.

Thompson's published application claims priority of several prior non-provisional applications. The referenced portions of Thompson's published application find support at least in Thompson's priority application No. 09/452,346, filed December 01, 1999.

Applicant cannot rely upon the foreign priority papers to overcome the rejection in further view of Igarashi et al. because a translation of said papers has not been made of record in accordance with 37 CFR 1.55. See MPEP § 201.15.

7. Claims 29 and 33-50 are rejected under 35 U.S.C. 103(a) as being unpatentable over Baldo et al. in *Appl. Phys. Lett.* 75(1), pp. 4-6 (July 5, 1999), in view of Egusa et al. (US 5,294,810) and either one of Igarashi et al. (US 2001/0019782 A1) or Thompson et al. (US 2002/0034656 A1).

Baldo et al. disclose light-emitting devices comprising a glass substrate, an anode, an organic compound layer including a light-emitting layer containing two light emitting materials, and a cathode. See the whole reference. In various devices, the light-emitting layer contains $Ir(ppy)_3$ and CBP.

"CBP" stands for 4,4'-N,N'-dicarbazole-biphenyl, which is a blue light-emitting material having a light-emitting wavelength peak of about 400 nm.

"$Ir(ppy)_3$" stands for *fac* tris(2-phenylpyridine) iridium, which is a green light-emitting orthometallated complex of iridium having a light-emitting wavelength peak of about 500 nm.

In Baldo's device comprising CBP doped with $Ir(ppy)_3$, a single light-emitting layer contains green and blue light-emitting materials. Baldo et al. do not disclose a device in which a red light-emitting material is used in combination with a blue light-emitting material and a red light-emitting material as required by the present claims. Further, Baldo's devices do not have different light-emitting layers as required by present claim 49, and do not emit white light as required by present claim 50.

It was known in the art at the time of the invention that the color of light emitted by a light-emitting device can be controlled by the selection of light-emitting materials used in the

device, and that emission of white light can be achieved by providing an appropriate combination of light-emitting materials.

Egusa et al. disclose light-emitting devices, teach that a light-emitting device may comprise more than one light-emitting layer (e.g. see column 11, line 40 - c. 12, l. 60 and c. 19, l. 52 - c. 20, l. 61), teach that different light-emitting materials may be mixed in a light-emitting layer in order to control light-emission wavelength and that the mixture may include a phosphorescent material emitting light from a triplet excited state (e.g. see c. 25, l. 36 - c. 27, l. 15), and teach that it is possible to achieve emission of white light from a device comprising multiple light-emitting layers and from a device comprising a mixture of light-emitting materials (e.g. see c. 20, l. 57-61 and c. 26, l. 15-28).

It would have been an obvious modification to one of ordinary skill in the art at the time of the invention to provide light-emitting devices similar to those disclosed by Baldo et al. but utilizing additional light-emitting materials in combination with the iridium complex either in the same layer or in a light-emitting layer separate from the layer comprising the iridium complex. One of ordinary skill in the art would have been motivated to utilize additional light-emitting materials in combination with the iridium complex so as to provide a device having the advantages of using a phosphorescent material as taught by Baldo et al. while at the same time being able to modify the color of light emitted by the device as taught by Egusa et al. It would have been within the level of ordinary skill of a worker in the art at the time of the invention, as a matter of routine experimentation, to determine suitable and optimum combinations of light-emitting materials selected from known light-emitting materials so as to obtain a functional

device capable of emitting light of the color(s) desired. One of ordinary skill in the art would have been motivated to select a combination of light-emitting materials capable of providing white light when the light-emitting device was intended to be used for an application where white light was desirable.

With respect to the requirement for an orthometallated complex as the red light-emitting material, orthometallated complexes that emit red light were known in the art at the time of the invention. Igarashi et al. disclose orthometallated complexes that emit red light and that are iridium complexes of a 2-phenylquinoline derivative (e.g. see paragraphs [0102]-[0125], [0177]-[0182] and [0186]). Thompson et al. also disclose orthometallated complexes that emit red light and that are iridium complexes (e.g. see Fig. 31, Fig. 37, Fig. 43 and paragraph [0183]). The selection of suitable and optimum combinations of red, green and blue light-emitting materials from known materials would have been within the level of ordinary skill of a worker in the art at the time of the invention as a matter of routine experimentation.

Thompson's published application claims priority of several prior non-provisional applications. The referenced portions of Thompson's published application find support at least in Thompson's priority application No. 09/452,346, filed December 01, 1999.

Applicant cannot rely upon the foreign priority papers to overcome the rejection in view of Igarashi et al. because a translation of said papers has not been made of record in accordance with 37 CFR 1.55. See MPEP § 201.15.

8. Applicant's arguments and the Rule 132 Declaration filed October 31, 2007 have been fully considered but they are not persuasive.

The paragraph bridging pages 3 and 4 of the Rule 132 Declaration refers to the device of Comparative Example 2 of the specification as a device containing green, blue and red light-emitting material in different layers. However, the last paragraph on page 23 of the specification indicates that the device of Comparative Example 2 was prepared in the same manner as Example 2 except for the use of coumarin 6 in place of $Ir(ppy)_3$. Example 2 (and therefore Comparative Example 2), have green, blue and red light-emitting materials combined in one layer.

Applicant argues that the present invention provides unexpectedly superior results.

As amended, the limitations of some of the pending claims are fully met by the Forrest et al. patent. A rejection under 35 U.S.C. 102 cannot be overcome by a showing of unexpectedly superior results. (Even if it could, the examiner notes that the data of record in the specification and the Rule 132 Declaration do not demonstrate unexpectedly superior results with respect to devices of present claims 29, 33-35 and 49 compared to Forrest's device of Example 1. Forrest demonstrates that a device using blue, green and red light-emitting materials wherein the green light-emitting material is an orthometallated complex having iridium as the metal and a 2-phenylpyridine derivative as the ligand has a higher maximum luminance and a greater efficiency than a similar device wherein the green light-emitting material is not an orthometallated complex. For example, see Fig. 2 and Fig. 3 in the Forrest patent.)

With respect to the rejections under 35 U.S.C. 103(a), it is the examiner's position that the data of record do not demonstrate unexpectedly superior results commensurate in scope with the claims. Further, it is questionable whether the data of record demonstrate unexpectedly superior results given the teachings of the prior art. As previously noted, Forrest demonstrates that using an orthometallated complex as a green light-emitting material in place of a green light-emitting material that is not an orthometallated complex results in a device having a higher maximum luminance and greater efficiency. While Baldo et al. do not provide a direct comparison between a device comprising $Ir(ppy)_3$ and a device lacking $Ir(ppy)_3$, Baldo et al. disclose maximum luminance and efficiency values for $Ir(ppy)_3$-containing devices that are higher than or comparable to those presently demonstrated.

The present specification only provides data for two devices wherein both the green and red light-emitting materials are orthometallated complexes (Example 2 and Example 4), and as can be seen from the data in Table 1, device performance characteristics such maximum luminance and light-emitting efficiency can vary greatly depending upon the specifics of the composition and device structure. The present claims do not limit the green and red light-emitting orthometallated complexes to specific complexes, and place no specific limitation on the blue light-emitting material. The blue, green and red light-emitting materials can be selected from various known materials. The examiner maintains the position that the selection of suitable and optimum combinations of red, green and blue light-emitting materials from known materials would have been within the level of ordinary skill of a worker in the art at the time of the invention as a matter of routine experimentation.

9. Any inquiry concerning this communication should be directed to Marie R. Yamnitzky at telephone number (571) 272-1531. The examiner works a flexible schedule but can generally be reached at this number from 7:00 a.m. to 3:30 p.m. Monday-Friday.

The current fax number for all official faxes is (571) 273-8300. (Unofficial faxes to be sent directly to examiner Yamnitzky can be sent to (571) 273-1531.)

MRY
January 21, 2008

Marie R. Yamnitzky

MARIE YAMNITZKY
PRIMARY EXAMINER

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